

AMENDMENTIn the Claims

Please amend the following claim:

5. (Once Amended) The system of Claim 1, wherein the expansion unit comprises:

a plurality of remote ATM-compatible interfaces; and

an expansion function, coupled with an input expansion port and an output expansion port, for communicating ATM cells in the upstream and downstream directions via the input and output expansion ports and for communicating ATM cells with the remote ATM-compatible interfaces, the input expansion port operable for coupling to the master unit, the output expansion port operable for coupling to another expansion unit.

Please add the following new claims:

8. In an expandable system for delivering to subscribers ATM-compatible services via a master unit, the master unit comprising:

a predetermined number of local ATM-compatible interfaces, each operable to communicate the ATM-compatible services comprising ATM cells with a corresponding subscriber;

an expansion function, coupled to the local ATM-compatible interfaces and to an expansion port, for communicating the ATM cells via the expansion port and for communicating the ATM cells with the local ATM-compatible interfaces; and

an ATM controller, coupled to an ATM-compatible network, to the local ATM-compatible interfaces, and to the expansion function, operable to process the ATM cells for distribution via the ATM-compatible network, the local ATM-compatible interfaces and the expansion port.

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9. The master unit of Claim 8, further comprising a Plain Old Telephone Service (POTS) interface, coupled to a Digital Line Carrier (DLC) system and to the local ATM-compatible interfaces, for communicating POTS signals between the DLC system and the subscribers serviced by the local ATM-compatible interfaces.

10. The master unit of Claim 8, wherein the ATM controller comprises:

an ATM network interface, coupled to the ATM-compatible network, for communicating the ATM cells with the ATM-compatible network;

an ATM layer processor, responsive to the ATM cells received from the ATM-compatible network to allocate selected ones of the ATM cells for delivery by the local ATM-compatible interfaces or via the expansion port, the ATM layer processor further operable to combine selected ones of the ATM cells received from the local ATM-compatible interfaces or the expansion port for delivery to the ATM-compatible network; and

a controller, coupled to the ATM network interface, the ATM layer processor, and the expansion function, for managing operations of the ATM controller and the expansion function.

11. The master unit of Claim 8, wherein the expansion port is coupled to an expansion unit via a flexible expansion link, the expansion unit operable to expand the delivery of ATM-compatible services to an additional set of subscribers other than the subscribers serviced by the predetermined number of the local ATM-compatible interfaces.

12. The master unit of Claim 11, wherein the master unit and the expansion unit comprise separate small form-factor assemblies, each capable of installation in different locations within a cabinet housing for a DLC1 system.

13. The master unit of Claim 11, wherein the expansion unit comprises:

a plurality of remote ATM-compatible interfaces for communicating ATM cells associated with ATM-compatible services with the additional set of subscribers;

an input expansion port for coupling to the expansion link to establish a communication link with the expansion port of the master unit; and

an expansion function, coupled to the input expansion port, for communicating the ATM cells in upstream and downstream directions via the input expansion port and for communicating the ATM cells with the remote ATM-compatible interfaces.

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14. The master unit of Claim 13, wherein the expansion unit further comprises an output expansion port for connecting the expansion unit to another expansion unit via a second expansion link, the expansion function of the expansion unit coupled to the output expansion port for communicating the ATM cells in the upstream and downstream directions via the output expansion port and for communicating the ATM cells with the remote ATM-compatible interfaces.

15. In an expandable system for delivering ATM-compatible services via an expansion unit operable to expand the delivery of ATM-compatible services to an additional set of subscribers other than subscribers serviced by a predetermined number of local ATM-compatible interfaces available at a Digital Line Carrier (DLC) system, the expansion unit comprising:


a plurality of remote ATM-compatible interface for communicating ATM cells associated with the ATM-compatible services with the additional set of subscribers;

an input expansion port for coupling to an expansion link to establish a communication link with the DLC system; and

an expansion function, coupled to the input expansion port, for communicating the ATM cells in the upstream and downstream directions via the input expansion port and for communicating the ATM cells with the remote ATM-compatible interfaces.

16. The expansion unit of Claim 15, wherein the expansion unit further comprises an output expansion port for connecting the expansion unit to another expansion unit via an expansion link, the expansion function coupled to the output expansion port for communicating the ATM cells in the upstream and downstream directions via the output expansion port and for communicating the ATM cells with the remote ATM-compatible interfaces.

17. The expansion unit of Claim 15, wherein the input port of the expansion unit is coupled to a master unit located at the DLC system, the master unit comprising:

 a predetermined number of the local ATM-compatible interfaces, each operable to communicate the ATM-compatible services comprising ATM cells with a corresponding subscriber;

an expansion function, coupled to the local ATM-compatible interfaces and to an expansion port, for communicating the ATM cells via the expansion port and for communicating the ATM cells with the local ATM-compatible interfaces; and

an ATM controller, coupled to an ATM-compatible network, to the local ATM-compatible interfaces, and to the expansion function, operable to process the ATM cells for distribution via the ATM-compatible network, the local ATM-compatible interfaces and the expansion port.

18. The expansion unit of Claim 17, further comprising a Plain Old Telephone Service (POTS) interface, coupled to a Digital Line Carrier (DLC) system and to the local ATM-compatible interfaces, for communicating POTS signals between the DLC system and the subscribers serviced by the local ATM-compatible interfaces.

19. The expansion unit of Claim 17, wherein the ATM controller comprises:

an ATM network interface, coupled to the ATM-compatible network, for communicating the ATM cells with the ATM-compatible network;

an ATM layer processor, responsive to the ATM cells received from the ATM-compatible network to allocate selected ones of the ATM cells for delivery by the local ATM-compatible interfaces or via the expansion port, the ATM layer processor further operable to combine selected ones of the ATM cells received from the local ATM-compatible interfaces or the expansion port for delivery to the ATM-compatible network; and

a controller, coupled to the ATM network interface, the ATM layer processor, and the expansion function of the master unit, for managing operations of the ATM controller and the expansion function.

20. A method for expanding the delivery of telecommunication services via a Digital Line Carrier (DLC) system, comprising:

providing a master unit at the DLC system, the master unit coupled to a wide area network (WAN) and operable to process telecommunication service signals for communication with the WAN and with a fixed number of telecommunication service interfaces at the master unit, the telecommunication service interfaces associated with a corresponding set of subscribers for the telecommunications services;

in the event that the number of subscribers desiring delivery of the telecommunication services exceeds the fixed number of telecommunications service interfaces at the master unit, then coupling an expansion unit to the master unit via an expansion link, the expansion unit comprising an expansion set of telecommunication service interfaces and operable to transmit telecommunication service signals in the upstream direction via the expansion link for processing by the master unit and to receive telecommunication service signals in the downstream direction from the master unit via the expansion link for delivery to the expansion set of telecommunication service interfaces.

21. The system of Claim 20, wherein, in the event that the number of subscribers desiring delivery of the telecommunication services exceeds the fixed number of telecommunications service interfaces at the master unit and the expansion set of telecommunication service interfaces available at the expansion unit, then coupling a second expansion unit to the expansion unit via a second expansion link, the second expansion unit comprising a second expansion set of telecommunication service interfaces and operable to transmit telecommunication service signals in the upstream direction via a combination of the expansion unit and the pair of expansion links for processing by the master unit and to receive telecommunication service signals in the downstream direction from the master unit via a combination of the expansion unit and the pair of expansion links for delivery to the second expansion set of telecommunication service interfaces.

22. A method for delivering an expanded set of telecommunications services with a master unit and one or more expansion units, the master unit coupled to one of the expansion units via an expansion link, each pair of expansion units coupled via another expansion link, the master unit operative to deliver the telecommunications services to a fixed number of subscribers, each expansion unit operative to deliver the telecommunications services to an expanded set of subscribers other than those serviced by the master unit, the method comprising the steps of:

(a) generating downstream data associated with the telecommunications services for transmission in the downstream direction from the master unit to the expansion unit coupled to the master unit via the expansion link;

(b) at the expansion unit, completing a synchronization of the expansion unit to a framing pattern contained in the downstream data and extracting information from the downstream data intended for delivery to the expansion unit,

(c) in the event that another expansion unit exists in the downstream path, then forwarding the downstream data from the expansion unit to the other expansion unit and repeating step (b) for the other expansion unit;

(d) in the event that another expansion unit does not exist in the downstream path, then generating upstream data associated with the telecommunications services for transmission in the upstream path from the expansion unit to the master unit, the expansion unit operable to insert information into the upstream data for delivery to the master unit; and

(e) in the event that another expansion unit exists in the upstream path, then forwarding the upstream data from the expansion unit to the other expansion unit and repeating step (d) for the other expansion unit, otherwise completing the loop of upstream data toward the master unit.

23. The method of Claim 22, wherein the telecommunication services comprise one of Asynchronous Transport Mode (ATM), Multiple Protocol Label Switching (MPLS) and Frame Relay-compatible services.

24. The method of Claim 22, wherein the master unit and each expansion unit comprise separate small form-factor assemblies, each capable of installation in different locations within a cabinet housing a Digital Line Carrier (DLC) system.

Q2 25. The method of Claim 22, wherein the telecommunications services comprise ATM-compatible services, and the downstream data and the upstream data comprise ATM cells, input/output (I/O) signals and a clock reference signal.

26. The method of Claim 22, wherein the downstream data and the upstream data are formatted to comply with the Low Voltage Differential Signal (LVDS) serial interface for distribution between the master unit and each expansion unit via each expansion link.



27. A method for delivering an expanded set of ATM-compatible services with a master unit and one or more expansion units, the master unit coupled to one of the expansion units via an expansion link, each pair of expansion units coupled via another expansion link, the master unit operative to deliver the ATM-compatible services to a fixed number of subscribers, each expansion unit operative to deliver the ATM-compatible services to an expanded set of subscribers other than those serviced by the master unit, the method comprising the steps of:

(a) processing at the master unit a plurality of ATM cells for communication with an ATM-compatible network and for communication with local ATM-compatible interfaces at the master unit and an expansion set of remote ATM-compatible interfaces at each expansion unit coupled to the master unit via an expansion link;

(b) communicating downstream data comprising ATM cells in the downstream direction from the master unit to the expansion unit via the expansion link for delivery to the remote ATM-compatible interfaces at the expansion unit;

(c) at the expansion unit, completing a synchronization of the expansion unit to a framing pattern contained in the downstream data and extracting the ATM cells from the downstream data intended for delivery to the remote ATM-compatible interfaces of the expansion unit,

(d) in the event that another expansion unit exists in the downstream path, then forwarding the downstream data from the expansion unit to the other expansion unit and repeating step (c) for the other expansion unit;

(e) in the event that another expansion unit does not exist in the downstream path, then generating upstream data comprising ATM cells associated with the ATM-compatible services for transmission in the upstream path from the expansion unit to the master unit, the expansion unit operable to insert the ATM cells into the upstream data for delivery to the master unit; and

(f) in the event that another expansion unit exists in the upstream path, then forwarding the upstream data from the expansion unit to the other expansion unit and repeating step (f) for the other expansion unit, otherwise completing the loop of upstream data to the master unit.

28. The method of Claim 27, wherein the downstream data and the upstream data further comprise input/output (I/O) signals and a clock reference signal.

29. The method of Claim 27, wherein the downstream data and the upstream data are formatted to comply with the Low Voltage Differential Signal (LVDS) serial interface for distribution between the master unit and each expansion unit via each expansion link.

30. The method of Claim 6, wherein a downstream path comprises one or more expansion units, and the step of communicating the ATM cells in the downstream direction comprises the steps of:

(a) sending the downstream data comprising the ATM cells in the downstream direction from the master unit to the expansion unit via the expansion link;

(b) at the expansion unit, completing a synchronization of the expansion unit to a framing pattern contained in the downstream data and extracting the ATM cells from the downstream data intended for delivery to the remote ATM-compatible interfaces of the expansion unit; and

(c) in response to determining that another expansion unit exists in the downstream path, then forwarding the downstream data from the expansion unit to the other expansion unit and repeating step (b) for the other expansion unit.

31. The method of Claim 6, wherein an upstream path comprises one or more expansion units, and the step of communicating the ATM cells in the upstream direction comprises the steps of:

(a) in response to determining that another expansion unit does not exist in the downstream path, sending upstream data comprising ATM cells associated with the ATM-compatible services for transmission in the upstream path from the expansion unit to the master unit, the expansion unit operable to insert the ATM cells into the upstream data for delivery to the master unit; and

(b) in response to determining that another expansion unit exists in the upstream path, the forwarding the upstream data from the expansion unit to the other expansion unit and repeating step (a) for the other expansion unit, otherwise completing the loop of upstream data to the master unit.

32. The system of Claim 7, wherein the master unit comprises:

the fixed number of local ATM-compatible interfaces, each operable to communicate the ATM-compatible services comprising ATM cells with a corresponding subscriber;

an expansion function, coupled to the ATM-compatible interfaces and to an expansion port, for communicating the ATM cells via the expansion port and for communicating the ATM cells with the ATM-compatible interfaces; and

an ATM controller, coupled to an ATM-compatible network, to the ATM-compatible interfaces, and to the expansion function, operable to process the ATM cells associated with the ATM-compatible services for distribution via the ATM-compatible network, the ATM-compatible interfaces and the expansion port.